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EXAMINER

LOPEZ, FRANK D

ART UNIT

PAPER NUMBER

3745

DATE MAILED: 01/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/981,414

Applicant(s)

RIBEIRO ET AL.

Examiner

F. Daniel Lopez

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-75 and 77 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18, 20-69, 71-75 and 77 is/are rejected.
- 7) ☒ Claim(s) 19 and 70 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 25 November 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>7, 9</u> . | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

Applicant's arguments filed November 25, 2002, have been fully considered but they are not deemed to be persuasive.

Applicant's arguments with respect to claims 1-18, 20-69, 71-75 and 77 have been considered but are deemed to be moot in view of the new grounds of rejection.

Applicant argues that there is no motivation to combine Berchem et al with the combination of either Jarrett, Kemnitz et al and Reinberger, or German 3,032,671, Baster and Reinberger. Applicant is incorrect. The combination has been modified to show the motivation of combining Berchem et al with the combination of either Jarrett, Kemnitz et al and Reinberger, or German 3,032,671, Baster and Reinberger. The motivation is that it minimizes post forging machining operations, as disclosed by Berchem et al (column 1 line 38-45).

Applicant argues that German 3,032,671 shows the details of the skirt. Applicant is partially correct. German 3,032,671 does not show details of the connection between the skirt portions and the pin bosses.

Applicant argues that there is no motivation to combine German 3,032,671 with Baster, since Baster clearly is cast due to the numerous cavities, and it is unclear how or why one of ordinary skill would combine the features of Baster with German 3,032,671, since they are completely different pistons. The only features of Baster, combined with German 3,032,671, are the connection between the skirt and the pin bosses, since German 3,032,671 does not show the details of this feature; and the recess 45, for the purpose of reducing an amount of oil wiped from the cylinder wall, to improve lubrication of the rings carried by the ring belt (column 4 line 3-8). One of ordinary skill in the piston art would understand how and why (as discussed above) to make the combination.

Applicant argues that since the forging in the lateral direction of Berchem et al is spaced from the skirt, it is unclear how Berchem et al can be applied to any of the other references to form recesses in the skirt, short of hindsight reconstruction of the claims. It

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is understood that Berchem et al teaches multiaxial forging of a piston which does not have a skirt, wherein the forging along an axis of pin bores, to forge pin bores (by dies 22, 23) and other recesses (by rams 24, 25) is done, to minimize machining after the forging process. This purpose is also applicable to forged pistons with skirts. One of ordinary skill in the forged piston art deals with forged pistons having integral skirts and skirts formed separate from the rest of the piston; and would recognize how to form pin bores in pistons with skirts, from the teaching of Berchem et al (using the rams 24, 25), and how to form any other recess in the piston, facing radially outward (using dies such as 22, 23). Therefore, one of ordinary skill in the forged piston art would understand how to apply Berchem et al to the other references, as discussed in the 103 rejections below.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

Claims 35, 42, 44-54, 56, and 58-66 are rejected under 35 U.S.C. § 103 as being unpatentable over Jarrett in view of Kemnitz et al. Jarrett discloses a piston comprising a piston head (42) having a ring belt with a plurality of ring grooves (66, 68, 70) formed therein and a combustion bowl (46); a pair of pin bosses (150) extending downwardly from the piston head and having pin bores (118) aligned along a common axis transverse to a longitudinal axis of the head; a piston skirt (110) in one piece with the

bosses wherein the bosses include tapered inner faces (e.g. column 4 line 62-67) set at an angle such that the width of the bosses increase continuously across the bores, and separated by a lateral space; a cavity (formed in part by 144, 102) is an oil gallery located above the bores in open communication with the space and being undercut in the bosses so as to extend laterally outwardly of the inner faces of the bosses in the direction of the boss axis, the piston head includes upper (42) and lower (44) forged steel crown parts having adjoined inner walls forming the inner wall and having a friction welded joint (column 5 line 50) passing through the cavity; wherein the piston head includes a second oil cooling gallery (140) with a closed bottom end; but does not disclose that the piston skirt includes a pair of opposed skirt portions spaced from the bosses and intervening strut portions extending between and uniting the skirt portions to the bosses, with the strut portions presenting outer surfaces facing in opposite directions along the bore axis and having lower edges, with recesses, symmetrical about a longitudinal axis containing the pin bore axis and the longitudinal axis, formed in the strut portions; or that the skirt portions have an upper free edge spaced and decoupled from the upper crown portion.

Kemnitz et al teaches, for a piston comprising a piston head having a ring belt (4) with a plurality of ring grooves formed therein and a combustion bowl (6); a pair of pin bosses extending downwardly from the piston head and having pin bores (7) aligned along a common axis transverse to a longitudinal axis of the head; and a piston skirt in one piece with the bosses; that the piston skirt including a pair of opposed skirt portions (11) spaced from the bosses and intervening strut portions extending between and uniting the skirt portions to the bosses, with the strut portions presenting outer surfaces facing in opposite directions along the bore axis and having lower edges, with recesses, symmetrical about a longitudinal axis containing the pin bore axis and the longitudinal axis, formed in the strut portions (the recess is relative to the outer surface of the skirt); and that the skirt portions have an upper edge either fixed to the upper crown portion (fig 4) or spaced and decoupled from the upper crown portion, by further recesses in the strut and skirt (fig 2).

Since the piston skirts of Jarrett and Kemnitz et al are functionally equivalent in the piston art; it would have been obvious at the time the invention was made to one having ordinary skill in the art to make the piston skirt of Jarrett include a pair of opposed skirt portions spaced from the bosses and intervening strut portions extending between and uniting the skirt portions to the bosses, with the strut portions presenting outer surfaces facing in opposite directions along the bore axis and having lower edges, with recesses, symmetrical about a longitudinal axis containing the pin bore axis and the longitudinal axis, formed in the strut portions; and with an upper free edge of the skirt portions spaced and decoupled from the upper crown portion, by further recesses in the strut and skirt as taught by Kemnitz et al, as a matter of engineering expediency.

Claims 71-75 are rejected under 35 U.S.C. § 103 as being unpatentable over Jarrett in view of Kemnitz et al, as discussed in the above rejection of claims 35, 42, 44-54, 56, and 58-66 above, and further in view of Berchem et al. The modified Jarrett discloses all of the elements of claims 71-75, including that the further recesses, formed in the skirt portion, are in areas inaccessible by forging in the longitudinal direction; but does not disclose that the recesses are forged.

Berchem et al teaches, for a piston comprising an upper crown portion (10) having including a ring belt and a combustion bowl; and a lower crown portion including a pair of pin bosses (5) extending downwardly from the upper crown portion and having pin bores (7) aligned along a common axis transverse to a longitudinal axis of the head and recesses (11) in areas inaccessible by forging in the longitudinal direction; that the recesses are forged (by dies 22, 23), for the purpose of minimizing machining operations after forging (column 1 line 38-45).

Since the lower crown portion of the modified Jarrett is a forged component and since Berchem et al teaches how to forge a recess in a forged component; it would have been obvious at the time the invention was made to one having ordinary skill in the art to make the recess of the modified Jarrett by forging, as taught by Berchem et al, for the purpose of minimizing machining operations after forging.

Claims 1-8, 13-18, 20-24, 26-34 and 77 are rejected under 35 U.S.C. § 103 as being unpatentable over Jarrett in view of Kemnitz, as applied to claim 35 above, and further in view of Berchem et al and Reinberger. The modified Jarrett discloses all of the elements of claims 1-16, 18, 20 and 21, including that there is an oil drain access opening and the further recesses, formed in the skirt portion, are in areas inaccessible by forging in the longitudinal direction; but does not disclose that the method of making the piston includes die forging a steel blank in a first axial direction, longitudinally of the piston, to produce the bosses, the skirt and a portion of the oil gallery; further forging the blank in a second axial direction in line with the pin bore axis, to produce the recesses and further recesses; and with the oil drain access opening forged.

Berchem et al teaches, for a method of making a piston comprising an upper crown portion (10) having a ring belt and a combustion bowl; and a lower crown portion including a pair of pin bosses (5) extending downwardly from the upper crown portion and having pin bores (7) aligned along a common axis transverse to a longitudinal axis of the head and recesses (11) in areas inaccessible by forging in the longitudinal direction; that the method includes die forging a steel blank in a first axial direction, longitudinally of the piston, to produce the bosses, and an upper surface of the blank; and further forging the blank in a second axial direction in line with the pin bore axis (by dies 22, 23), to produce the pin bores and recesses, for the purpose of minimizing machining operations after forging (column 1 line 38-45).

Reinberger teaches, for a method of making a piston comprising a ring belt, a pair of pin bosses (14) extending downwardly from a piston head and having pin bores (14a) aligned along a common axis transverse to a longitudinal axis of the head and a piston skirt (13); that the method includes die forging a blank in a first axial direction, longitudinally of the piston, to produce the bosses and the skirt.

Since Jarrett discloses using a forged component and Berchem et al and Reinberger teaches a method of forming a forged component; it would have been obvious at the time the invention was made to one having ordinary skill in the art to make the pressed piston skirt component of Jarrett by die forging a steel blank in a first axial direction, longitudinally of the piston, to produce the bosses, an upper surface of

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the blank (forming the oil gallery floor), including the oil drain access opening, and the piston skirt; and further forging the blank in a second axial direction in line with the pin bore axis, to produce the pin bores, recess and further recess, as taught by Berchem et al and Reinberger, as a matter of engineering expediency. One of ordinary skill in the die forging art would know how to form the oil gallery floor, the oil drain access opening and the recess by the forging operation, for the purpose of decreasing the post forging machining operations.

Claims 67-69 are rejected under 35 U.S.C. § 103 as being unpatentable over Jarrett in view of Kemnitz, Berchem et al and Reinberger, as applied to claim 1 above, and further in view of Tool Engineers Handbook. The modified Jarrett discloses all of the elements of claims 67-69; but does not disclose that an inner wall of the skirt portion is tapered in the longitudinal direction such that an upper region of the skirt portion is thicker than the lower end, with an angle between the inner and outer walls of the skirt portion being about or greater than 2 degrees.

Tool Engineers Handbook teaches, for a part that is forged and has an inside surface; that the inside surface is tapered (draft) at an angle of 10 degrees, for the purpose of easily withdrawing the die from the forged part (page 1021 second full paragraph).

Since the modified Jarrett and Tool Engineers Handbook are both from the same field of endeavor (i.e. dealing with forged parts), the purpose disclosed by Tool Engineers Handbook would have been recognized in the pertinent art of Jarrett. It would have been obvious at the time the invention was made to one having ordinary skill in the art to forge the skirt of Jarrett with a slightly tapered inner wall, in the longitudinal direction such that an upper region of the skirt portion is thicker than the lower end, at an angle of 10 degree, as taught by Tool Engineers Handbook, for the purpose of easily withdrawing the die from the forged piston.

Claims 35-39, 42-47, 50 and 58- 66 are rejected under 35 U.S.C. § 103 as being unpatentable over Amdall in view of Jarrett. Amdall discloses a piston comprising a piston head (18) having a ring belt (24) with a plurality of ring grooves formed therein and a combustion bowl; a pair of pin bosses (15) extending downwardly from the piston head and having pin bores aligned along a common axis transverse to a longitudinal axis of the head; a piston skirt (20) in one piece with the bosses including a pair of opposed skirt portions (20a, 20b) spaced from the bosses and intervening strut portions (see e.g. fig 2) extending between and uniting the skirt portions to the bosses, with the strut portions presenting outer surfaces facing in opposite directions along the bore axis and having lower edges; recesses (see e.g. fig 1, between 50 and strut portions) formed in the strut portions; wherein the bosses include inner faces set at an angle such that the bosses have a varying width longitudinally, and separated by a lateral space; a cavity (formed in part by 46) located above the bores in open communication with the space and being undercut in the bosses so as to extend laterally outwardly of the inner faces of the bosses in the direction of the boss axis, the piston head includes cast iron upper and lower crown parts (e.g. column 2 line 27-31) having adjoined inner walls forming the inner wall and having a welded joint (19) passing through the cavity; wherein the piston head includes an oil cooling gallery (26) with a closed bottom end (formed by 50, e.g. fig 6, 7); but does not disclose that the weld joint is a friction weld joint; that the upper and lower crown are made of forged steel; or that the inner faces are set at an angle such that the width of the bosses increase continuously across the bores.

Jarrett teaches, for a piston comprising a piston head (42) having a ring belt with a plurality of ring grooves (66, 68, 70) formed therein and a combustion bowl (46); a pair of pin bosses (150) extending downwardly from the piston head and having pin bores (118) aligned along a common axis transverse to a longitudinal axis of the head; wherein the bosses include inner faces set at an angle such that the bosses have a varying width longitudinally (e.g. column 4 line 62-67), and separated by a lateral space; a cavity (formed in part by 144, 102) located above the bores in open communication with the space and being undercut in the bosses so as to extend laterally outwardly of

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the inner faces of the bosses in the direction of the boss axis, the piston head includes upper (42) and lower (44) crown parts having adjoined inner walls forming the inner wall and having a welded joint passing through the cavity; that the weld joint is a friction weld joint (column 5 line 50); that the upper and lower crown are made of steel, either cast or forged (column 2 line 62-65, column 3 line 57-59); and that the inner faces are set at an angle such that the width of the bosses increase continuously across the bores e.g. column 4 line 61-67).

Since the materials, the welding joints and the inner faces of the pistons of Amdall and Jarrett, are functionally equivalent in the piston art, it would have been obvious at the time the invention was made to one having ordinary skill in the art to make the upper and lower crown of Amdall of forged steel, to make the weld joint of Amdall a friction weld joint and to make the inner faces of Amdall increase continuously across the bores, as taught by Jarrett, as a matter of engineering expediency.

Claims 71 and 72 are rejected under 35 U.S.C. § 103 as being unpatentable over Amdall in view of Jarrett, as discussed in the above rejection of claims 35-39, 42-47, 50 and 58- 66 above, and further in view of Berchem et al. The modified Amdall discloses all of the elements of claims 71 and 72, including that the recesses, formed in the skirt, are in areas inaccessible by forging in the longitudinal direction; but does not disclose that the recesses are forged.

Berchem et al teaches, for a piston comprising an upper crown portion (10) having including a ring belt and a combustion bowl; and a lower crown portion including a pair of pin bosses (5) extending downwardly from the upper crown portion and having pin bores (7) aligned along a common axis transverse to a longitudinal axis of the head and recesses (11) in areas inaccessible by forging in the longitudinal direction; that the recesses are forged (by dies 22, 23), for the purpose of minimizing machining operations after forging (column 1 line 38-45).

Since the lower crown portion of the modified Amdall is a forged component and since Berchem et al teaches how to forge a recess in a forged component; it would have been obvious at the time the invention was made to one having ordinary skill in the

art to make the recess of the modified Amdall by forging, as taught by Berchem et al, for the purpose of minimizing machining operations after forging.

Claims 35-44, 47, 48, 50, 71 and 73 are rejected under 35 U.S.C. § 103 as being unpatentable over German 3,032,671 in view of Baster and Berchem et al. German 3,032,671 discloses a steel piston comprising a piston head (2) having a ring belt with a plurality of ring grooves (7) formed therein and a combustion bowl (10); a pair of pin bosses (32) extending downwardly from the piston head and having pin bores aligned along a common axis transverse to a longitudinal axis of the head and having laterally opposed edges; a piston skirt in one piece with the bosses including a pair of opposed skirt portions; an upper end of the piston skirt includes inner and outer walls welded to inner and outer walls of a lower end of the ring belt, forming a closed oil cooling gallery (6) in the piston head; but does not disclose that the pair of opposed skirt portions are spaced from the bosses and intervening strut portions extend between and unite the skirt portions to the bosses, with the strut portions presenting outer surfaces facing in opposite directions along the bore axis and having lower edges, with recesses formed symmetrically across a longitudinal plane containing the longitudinal axis of the piston and the bore axis, in outer surfaces of the strut portions, skirts and bosses, which extend laterally inwardly of the pin bore edges and across the longitudinal axis above the pin bore axis and are spaced from the lower edges of the skirt.

Baster teaches, for a piston comprising a piston head (10) having a ring belt with a plurality of ring grooves (23) formed therein and a combustion bowl (19); a pair of pin bosses (32) extending downwardly from the piston head and having pin bores (33) aligned along a common axis transverse to a longitudinal axis of the head; a piston skirt in one piece with the bosses including a pair of opposed skirt portions (46); that the pair of opposed skirt portions are spaced from the bosses, with intervening strut portions extending between and uniting the skirt portions to the bosses, with the strut portions presenting outer surfaces facing in opposite directions along the bore axis and having lower edges, with recesses (45) formed symmetrically across a longitudinal plane containing the longitudinal axis of the piston and the bore axis, in outer surfaces of the

strut portions, skirts and bosses, which extend laterally inwardly of the pin bore edges and across the longitudinal axis above the pin bore axis and are spaced from the lower edges of the skirt, for the purpose of reducing an amount of oil wiped from the cylinder wall, to improve lubrication of the rings carried by the ring belt (column 4 line 3-8).

Since German 3,032,671 does not show details of a connection between the pair of opposed skirt portions and the bosses, and Baster does; it would have been obvious at the time the invention was made to one having ordinary skill in the art to space the pair of opposed skirt portions of German 3,032,671 from the bosses and use intervening strut portions to extend between and unite the skirt portions to the bosses, with the strut portions presenting outer surfaces facing in opposite directions along the bore axis and having lower edges, as taught by Baster, as a matter of engineering expediency, and with recesses formed symmetrically across a longitudinal plane containing the longitudinal axis of the piston and the bore axis, in outer surfaces of the strut portions, skirts and bosses, which extend laterally inwardly of the pin bore edges and across the longitudinal axis above the pin bore axis and are spaced from the lower edges of the skirt, as taught by Baster, for the purpose of reducing an amount of oil wiped from the cylinder wall, to improve lubrication of the rings carried by the ring belt.

Berchem et al teaches, for a piston comprising an upper crown portion (10) having including a ring belt and a combustion bowl; and a lower crown portion including a pair of pin bosses (5) extending downwardly from the upper crown portion and having pin bores (7) aligned along a common axis transverse to a longitudinal axis of the head and recesses (11) in areas inaccessible by forging in the longitudinal direction; that the recesses are forged (by dies 22, 23), for the purpose of minimizing machining operations after forging (column 1 line 38-45).

Since the lower crown portion of the modified German 3,032,671 is a forged component and since Berchem et al teaches how to forge a recess in a forged component; it would have been obvious at the time the invention was made to one having ordinary skill in the art to make the recess of the modified German 3,032,671 by forging, as taught by Berchem et al, for the purpose of minimizing machining operations after forging.

Claims 1-16, 18, 20, 21 and 77 are rejected under 35 U.S.C. § 103 as being unpatentable over German 3,032,671 in view of Baster and Berchem et al, as applied to claim 35 above, and further in view of Berchem et al and Reinberger. The modified German 3,032,671 discloses all of the elements of claims 1-16, 18, 20 and 21, including that the skirt portion is a pressed steel component (abstract) and has an oil drain access opening; but does not disclose that the method of making the piston includes die forging a steel blank in a first axial direction, longitudinally of the piston, to produce the bosses, the skirt and a portion of the oil gallery; further forging the blank in a second axial direction in line with the pin bore axis, to produce the recesses; and with the oil drain access opening forged.

Berchem et al teaches, for a method of making a piston comprising an upper crown portion (10) having a ring belt and a combustion bowl; and a lower crown portion including a pair of pin bosses (5) extending downwardly from the upper crown portion and having pin bores (7) aligned along a common axis transverse to a longitudinal axis of the head and recesses (11) in areas inaccessible by forging in the longitudinal direction; that the method includes die forging a steel blank in a first axial direction, longitudinally of the piston, to produce the bosses, and an upper surface of the blank; and further forging the blank in a second axial direction in line with the pin bore axis (by dies 22, 23), to produce the pin bores and recesses, for the purpose of minimizing machining operations after forging (column 1 line 38-45).

Reinberger teaches, for a method of making a piston comprising a ring belt, a pair of pin bosses (14) extending downwardly from a piston head and having pin bores (14a) aligned along a common axis transverse to a longitudinal axis of the head and a piston skirt (13); that the method includes die forging a blank in a first axial direction, longitudinally of the piston, to produce the bosses and the skirt.

Since German 3,032,671 discloses using a pressed component and Berchem et al and Reinberger teaches a method of forming a pressed component; it would have been obvious at the time the invention was made to one having ordinary skill in the art to make the pressed piston skirt component of German 3,032,671 by die forging a steel blank in a first axial direction, longitudinally of the piston, to produce the bosses, an

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upper surface of the blank (forming the oil gallery floor), including the oil drain access opening, and the piston skirt; and further forging the blank in a second axial direction in line with the pin bore axis, to produce the pin bores and recess, as taught by Berchem et al and Reinberger, for the purpose of minimizing machining operations after forging. One of ordinary skill in the die forging art would know how to form the oil gallery floor, the oil drain access opening and the recess by the forging operation, for the purpose of decreasing the post forging machining operations.

Claims 67-69 are rejected under 35 U.S.C. § 103 as being unpatentable over German 3,032,671 in view of Baster, Berchem et al and Reinberger, as applied to claim 1 above, and further in view of Tool Engineers Handbook. The modified German 3,032,671 discloses all of the elements of claims 67-69; but does not disclose that an inner wall of the skirt portion is tapered in the longitudinal direction such that an upper region of the skirt portion is thicker than the lower end, with an angle between the inner and outer walls of the skirt portion being about or greater than 3 degrees.

Tool Engineers Handbook teaches, for a part that is forged and has an inside surface; that the inside surface is tapered (draft) at an angle of 10 degrees, for the purpose of easily withdrawing the die from the forged part (page 1021 second full paragraph).

Since the modified German 3,032,671 and Tool Engineers Handbook are both from the same field of endeavor (i.e. dealing with forged parts), the purpose disclosed by Tool Engineers Handbook would have been recognized in the pertinent art of German 3,032,671. It would have been obvious at the time the invention was made to one having ordinary skill in the art to forge the skirt of German 3,032,671 with a slightly tapered inner wall, in the longitudinal direction such that an upper region of the skirt portion is thicker than the lower end, at an angle of 10 degree, as taught by Tool Engineers Handbook, for the purpose of easily withdrawing the die from the forged piston.

Claims 45, 46, 49, 51, and 53-57 are rejected under 35 U.S.C. § 103 as being unpatentable over German 3,032,671 in view of Baster and Berchem et al, as applied to claim 35 above, and further in view of Martins Leites et al. The modified German 3,032,671 discloses all of the elements of claims 45, 46, 49, 51, 53-57, 71, 73 and 76, including a ring groove located below the weld joint, that the oil gallery is formed by a circumferential recess extends into the skirt portion and that the weld in the outer walls is below the weld in the inner walls; but does not disclose that the weld is a friction weld or that the weld in the outer walls is above the weld in the inner walls. Claims 17 and 22-26 are rejected under 35 U.S.C. § 103 as being unpatentable over German 3,032,671 in view of Baster, Berchem et al and Reinberger, as applied to claim 15 and 21, respectively, above, and further in view of Martins Leites et al. The modified German 3,032,671 discloses all of the elements of claims 17 and 22-26; but does not disclose that the weld is a friction weld

Martins Leites et al teaches, for a steel piston comprising a piston head (10) having a ring belt with a plurality of ring grooves (15) formed therein and a combustion bowl (11); a pair of pin bosses (23) extending downwardly from the piston head and having pin bores (24) aligned along a common axis transverse to a longitudinal axis of the head; wherein the piston head includes upper and lower crown parts having adjoined inner and outer walls joined together by a welded joint; that the weld joint is a friction weld joint, for the purpose of welding without melting the materials to be joined, thereby maintaining the structural properties of the materials (column 2 line 51-52).

Since German 3,032,671 and Martins Leites et al are both from the same field of endeavor, the purpose disclosed by Martins Leites et al would have been recognized in the pertinent art of German 3,032,671. It would have been obvious at the time the invention was made to one having ordinary skill in the art to make the weld joint of German 3,032,671 a friction weld joint, as taught by Martins Leites et al, for the purpose of welding without melting the materials to be joined, thereby maintaining the structural properties of the materials.

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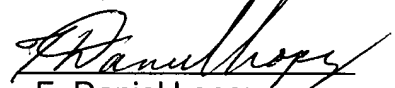
German 3,032,671 teaches that the weld joint in the outer wall can be in a variety of positions, including in the upper surface, so as to be above the weld joint in the inner wall. Since the position of the weld joint in the outer wall can be in a variety of places; it would have been obvious at the time the invention was made to one having ordinary skill in the art to locate the weld joint in the outer wall of German 3,032,671 above the weld joint in the inner wall, as taught by German 3,032,671, as a matter of engineering expediency.

Conclusion

Claims 19 and 70 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dan Lopez whose telephone number is (703) 308-0008. The examiner can normally be reached on Monday-Thursday from 6:30 AM -4:00 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Look, can be reached on (703) 308-1044. The fax number for this group is (703) 872-9302. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0861.



F. Daniel Lopez
Primary Examiner
Art Unit 3745
January 2, 2003